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Cost of Producing and Marketing Finished Beef in Relation to Consuming Areas

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BY

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This study was originally prepared as a Master of Science Thesis at South Dakota State College

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Dwayne A. Myers*

The major portion of South Dakota's resources have historically been chiefly employed in the production of agricultural commodities. Continuation of this pattern of resource use appears likely. However, changes in consumption patterns for various food products necessitates continuing examination of the alternative placement of productive resources within the agricultural sector, on both the individual and aggregate levels.

South Dakota exports a large part of its agricultural production. The commodities exported and the form in which they are exported are determinants of the returns producers receive for the employment of their resources. The declining per capita consumption of cereal grain products and the increasing consumption of red meats suggests an investigation of the ability of South Dakota producers' to compete in the expanding market for red meats.

Objectives of the Study

The objectives of this study were: (1) To determine the principal costs for bringing beef cattle from 400 pound weight to a finished weight of 1150 pounds in South Dakota and in other selected areas. Two main categories of cost are purchase price of the animal and feed costs. (2) To compare the cost of marketing beef produced in South Dakota with beef produced in selected consumption areas of the United States. Transportation and shrinkage costs from South Dakota to the consumption area comprise the principal marketing costs.

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Procedure

Beef cattle growing and fattening rations were obtained from Agricultural Extension personnel for each of the major geographic sections of the United States. One state was selected to represent each region, the criterion for selection being the existence of a market for considerable quantities of beef, based on population. The states and regions were California (West), North Carolina (South), New York (Northeast), Michigan (East North Central), and South Dakota (West North Central).

Price data for feeder calves and feedstuffs, by states, were obtained from published U.S. Department of Agriculture. Computations were made using 1960 prices and 1950-59 average prices.

Railroad shipping rates for live animals and dressed meat were obtained from published tariffs, through the cooperation of the South Dakota Public Utilities Commission and the traffic department of John Morrell and Company, Sioux Falls, South Dakota.

Estimates of live animal in-transit shrinkage were computed on the basis of results of a 1957 study by the Western Regional Livestock Marketing Research Committee.

Assumptions and Limitations

It was assumed that equal costs of labor, capital, and management for cattle feeding, and equal slaughtering costs exist in the various regions for which cost comparisons were made. The assumption was justified on the following basis: Labor costs might be less in South Dakota because of the lack of alternative industrial employment for the labor supply. At least partially offsetting this might be

somewhat more expensive capital in South Dakota, due to a greater element of risk involved in cattle feeding in an area with a highly fluctuating feed supply. If a difference in management exists between areas, experience, and education should tend to minimize such difference over a period of time. From the preceding reasoning, it was judged that the aggregate net effect of this assumption was not great.

Transportation rate data for shipping live animals and dressed beef by truck were not available. In some instances costs of transporting by truck might vary considerably from railroad freight costs.

The cost of producing and marketing beef in surplus producing areas other than South Dakota was not considered in the study. Therefore, it was not determined whether South Dakota producers could compete with these areas in producing and marketing finished beef.

RATIONS, FEED PRICES, AND COST OF GAIN, BY REGIONS

Calf Ration Costs

A standard ration was used in all regions to bring calves from 400 to 650 pounds. The only variable was the price differences for the ingredients among the regions. The ration consisted of 17.58 bushels of corn, 187.5 pounds of cottonseed meal or soybean meal, and 0.187 tons of mixed hay. This ration will provide about two pounds of gain per day.[1]

The cost of bringing an animal from 400 to 650 pounds at 1950-59 feed prices ranged from $40.14 in the Western region to $33.25 in the

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[1]James O'Connell, Extension Animal Husbandman, South Dakota State College: Brookings, South Dakota, Personal interview, February, 1962.

West North Central region (South Dakota). The cost in the other regions was Southern, $38.05; Northeastern, $37.96; and East North Central, $36.85.

Application of 1960 feed prices resulted in lower costs of gain from 400 to 650 pounds. The Western region again had the highest cost, $35.88. Other regions, ranked from highest to lowest cost, were Northeastern, Southern, East North Central and West North Central. The latter (South Dakota) cost was $26.01 (Table 1)

Table 1. Total Cost by Ingredients[a] for Bringing Calves from 400 to 650 Pounds, By Regions, Using 1950-59 and 1960 Average Prices[b]

Region Represented	1950-59 Average Prices				1960 Prices			
	Corn $	Cottonseed or Soybean Meal $	Hay $	Total Cost $	Corn $	Cottonseed or Soybean Meal $	Hay $	Total Cost $
Southern	25.46	6.88	5.71	38.05	20.22	7.31	5.52	33.05
Western	30.06	5.58	4.50	40.14	24.08	7.31	4.49	35.88
Northeastern	26.37	7.51	4.08	37.96	21.80	7.93	3.93	33.66
E. North Central	24.61	8.47	3.77	36.85	17.40	8.72	3.27	29.39
W. North Central	21.45	8.85	2.95	33.25	15.12	7.80	3.09	26.01

[a]James O'Connell, Extension Animal Husbandman, South Dakota State College: Brookings, South Dakota, Personal interview, February, 1962.

[b]Individual prices and computation of costs are given in Appendix B, using 1950-59 average prices.

Rate of Gain

It was necessary to ascertain the daily rate of gain for beef cattle on full feed in order to compute the total feed required to finish an

animal. Rate of gain, by regions, was estimated from data provided by publications and correspondents in the regions involved. The causes of the variation among regions, from 2.85 pounds per day in the Western region to 1.60 pounds per day in the Northeastern region, cannot be definitely determined. Assuming that the figures represent typical gains for each region, some of the factors influencing the differences might include climate, management, type of ration, and type of animals being fed. The daily rate of gain for each region, as used in this study, and the sources are given in Table 2.

Table 2. Average Daily Gain for Beef Cattle on Full Feed, from 650 to 1150 Pounds, By Regions

Region Represented	Amount of Gain (Lbs. Per Day)
Southern	2.51[a]
Western	2.85[b]
Northeastern	1.60[c]
East North Central	2.23[d]
West North Central	2.20[e]

[a] Diethylstilbestrol in Fattening Rations for Dry-lot Steers, Bulletin 483, p. 10, South Carolina Agricultural Experiment Station, Clemson College: Clemson, South Carolina, September, 1960.

[b] Horace T. Strong, Extension Animal Husbandman, Agricultural Extension Service, University of California: Davis, California, Letter to author, January 2, 1962.

[c] J. I. Miller and F. B. Morrison, Use of Pasture for Fattening Steers, Bulletin 890, p.32, Cornell University Agricultural Experiment Station: Ithaca, New York, March, 1953.

[d] Minutes of Interregional Livestock Co-ordinating Research Committee, Table 8: Stillwater, Oklahoma, October 27-28, 1960.

[e] Hal Routhe and Paul Hasbarger, Cattle Feeders Guide, p. 2, Agricultural Extension Service, University of Minnesota: St. Paul, Minnesota, 1961-62.

Feed Cost

The feed cost for bringing an animal from 650 pounds to 1150 pounds constitutes one of the major costs in carrying on a feeding operation. In one area it was estimated that feed costs constitutes 80 to 86 percent of the total expenditure, including an interest allowance for the investment in the feeder animal.[2]

[2] Cattle Feeding in California. A Study of Feed-lot Finishing. p.27 Economics Department, Bank of America: San Francisco, California, February, 1957.

A typical ration for fattening an animal from 650 pounds to 1150 pounds was developed for each region. The length of the feeding period and the amount of feed utilized varied by regions, depending upon the rate of gain for the region.

Southern Region

Total feed cost for feeding an animal from 650 to 1150 pounds in North Carolina (Southern region), using 1960 prices, was $104.65. The cost of gain per pound was 21 cents. The 1950-59 total cost was $116.52, for a cost per pound gain of 23 cents. (Table 3)

Table 3. Cost of Ingredients for a Typical Ration[a] for Beef Cattle 650-1150 Pounds for North Carolina (Southern Region) Using 1950-59 and 1960 Average Prices

Ingredient	Amount Used	1950-59 Price[b]	Total Cost	1960 Price[c]	Total Cost
Corn	41 Bu	$1.46 Bu	$59.86	$1.15 Bu	$47.15
Oats	23.9 Bu	0.80 Bu	19.12	0.79 Bu	18.88
Cottonseed Meal	574.05 lbs	3.67 Cwt[d]	21.07	3.90 Cwt	22.39
Alfalfa Meal Pellets	0.0956 T	98.00 T[e]	9.37	98.00 T	9.37
Mixed Hay	0.2327 T	$30.52 T	7.10	$29.50 T	6.86
			$116.52		$104.65

Cost of Gain per lb. using 1950-59 prices: $0.23
Cost of Gain per lb. using 1960 prices: $0.21

[a] Diethylstilbestrol in Fattening Rations for Dry-lot Steers, Bulletin 483, p. 10, South Carolina Agricultural Experiment Station, Clemson College: Clemson, South Carolina, September, 1960.

[b] 1950 through 1954, Crop Values, Field and Seed Crops By States, 1949-54, Statistical Bulletin No. 208, United States Department of Agriculture, Agricultural Marketing Service, Crop Reporting Board: Washington, D. C., May, 1957. 1955 through 1959 Crop Values, Season Average Prices Received by Farmers and Value of Production by States, United States Department of Agriculture, Agricultural Marketing Service: Washington, D.C., 1955-1960 issues.

[c] Agricultural Prices, 1960 Annual Summary, United States Department of Agriculture, Statistical Reporting Service, Crop Reporting Board: Washington, D.C., June, 1961.

[d] Agricultural Prices, United States Department of Agriculture, Statistical Reporting Service, Crop Reporting Board: Washington, D.C., January 1955-December 1959 issues.

[e] South Carolina Agricultural Experiment Station, Bulletin 483, p. 12.

Western Region

California, selected to represent the Western region, is unique in its possessing by-products from other agricultural enterprises. Some of those by-products can be utilized in rations for fattening beef. The economic advantage of using these ingredients is not easily assessable, because there is usually not an established price for them. The limited mobility of the by-products, together with their lack of usefulness for any other purpose, causes their price to be subject to a considerable degree of fluctuation from area to area, and from one time to another. California's use of by-products has helped to ease its dependence on conventional grains.

Total cost for a typical ration in California, using 1960 prices, was $88.70. The cost per pound of gain was 18 cents. The 1950-59 price gave a total cost of $96.24 and a cost per pound of gain of 19 cents. (Table 4)

Table 4. Cost of Ingredients for a Typical Ration[a] for Beef Cattle 650-1150 Pounds for California (Western Region) Using 1950-59 and 1960 Average Prices

Ingredient	Amount Used	1950-59 Price[b]	Total Cost	1960 Price[b]	Total Cost
Alfalfa Hay	0.38 T	$24.05 T[c]	$9.14	$27.68 T[d]	$10.52
Barley Straw	0.1425 T	15.00 T	2.14	19.00 T	2.71
Barley	61.38 Bu	1.20 Bu[e]	73.66	1.01 Bu[d]	61.99
Molasses	0.213 T	18.00 T	3.83	23.50 T	5.01
Beet Pulp	0.166 T	$45.00 T	7.47	$51.00 T	8.47
			$96.24		$88.70

Cost of Gain per lb. using 1950-59 prices: $0.19
Cost of Gain per lb. using 1960 prices: $0.18

[a]Horace T. Strong, Extension Animal Husbandman, Agricultural Extension Service, University of California: Davis, California, Letter to the author, November 27, 1961.

[b]Horace T. Strong, loc. cit., letter of January 10, 1962.

[c]Agricultural Prices, United States Department of Agriculture, Statistical Reporting Service, Crop Reporting Board: Washington, D.C., January 1955-December 1959 issues.

[d]Agricultural Prices, 1960 Annual Summary, United States Department of Agriculture, Statistical Reporting Service, Crop Reporting Board: Washington, D.C., June, 1961.

[e]1950 through 1954 crop values, Field and Seed Crops by States, 1949-54, Statistical Bulletin No. 208, United States Department of Agriculture, Agricultural Marketing Service, Crop Reporting Board: Washington, D.C., May, 1957. 1955 through 1959 crop values, Season Average Prices Received by Farmers and Value of Production by States, United States Department of Agriculture, Agricultural Marketing Service: Washington, D.C., 1955-1960 issues.

Northeastern Region

It is a general practice in New York State to rough feeder cattle through the winter, graze on pasture, and then finish in dry-lot. The ration for the Northeastern region included corn silage and pasture.

Using 1960 prices the total cost of feeding animals from 650 to 1150 pounds with the New York ration was $97.11. The cost per pound of gain was 19 cents. Using 1950-59 prices the total cost was $101.98, at a cost per pound of gain of 20 cents. (Table 5)

Table 5. Cost of Ingredients for a Typical Ration[a] for Beef Cattle 650-1150 Pounds for New York (Northeastern Region) Using 1950-59 and 1960 Average Prices

Ingredient	Amount Used	1950-59 Price	Total Cost	1960 Price[b]	Total Cost
Ground Corn	19.6 Bu	$ 1.49 Bu[c]	$29.20	$ 1.24 Bu	$24.30
Linseed Meal	0.04 T	80.67 T[d]	3.23	4.72 Cwt	3.78
Soybean Oil Meal	0.04 T	80.17 T[d]	3.21	4.23 Cwt	3.38
Mixed Hay	0.605 T	21.80 T[c]	13.19	21.00 T	12.71
Corn Silage	3.642 T	9.57 T[e]	34.85	9.51 T[f]	34.64
Pasture Days	3.66 mos.	5.00 mos.[f]	18.30	5.00 mos.[f]	18.30
			$101.98		$97.11

Cost of Gain per lb. using 1950-59 prices: $0.20
Cost of Gain per lb. using 1960 prices: $0.19

[a]J.I. Miller and F. B. Morrison, Use of Pasture for Fattening Steers, Bulletin 890, p.32, Cornell University Agricultural Experiment Station: Ithaca, New York, March, 1953.

[b]Agricultural Prices, 1960 Annual Summary, United States Department of Agricultural Statistical Reporting Service, Crop Reporting Board: Washington, D. C., June, 1961.

[c]1950 through 1954 crop values, Field and Seed Crops by States, 1949-54 Statistical Bulletin No. 208, United States Department of Agriculture, Agricultural Marketing Service, Crop Reporting Board: Washington, D.C., May, 1957. 1955 through 1959 crop values, Season Average Prices Received by Farmers and Value of Production by States, United States Department of Agriculture, Agricultural Marketing Service: Washington, D.C., 1955-1960 issues.

[d]1954-59 average only, S.T. Slack, Associate Professor, Department of Animal Husbandry, Cornell University: Ithaca, New York, Letter to the author, January 26, 1962.

[e]1954-58 average only, S.T. Slack, loc. cit., Letter to the author, January 26, 1962.

[f]S.T. Slack, loc. cit., Letter to the author, January 26, 1962.

East North Central Region

Total cost for a typical ration in Michigan, East North Central region, computed with 1960 prices was $76.72. The cost per pound of gain was 15 cents. The 1950-59 price gave a total cost of $93.23 and a cost of gain per pound of 19 cents (Table 6)

Table 6. Cost of Ingredients for a Typical Ration[a] for Beef Cattle 650-1150 Pounds for Michigan (East North Central Region) Using 1950-59 and 1960 Average Prices

Ingredient	Amount Used	1950-59 Price[b]	Total Cost	1960 Price[c]	Total Cost
Corn Silage	1.48 T	$8.00 T[d]	$11.84	$8.00 T[d]	$11.84
Alfalfa Hay	0.313 T	25.53 T[e]	7.99	23.77 T	7.44
Ground Shelled Corn	19.2 Bu	1.40 Bu	26.88	0.99 Bu	19.01
Cottonseed Meal	380.5 Lbs	4.52 Cwt[f]	17.20	4.65 Cwt	17.70
Ground Ear Corn	20.94 Bu	$1.40 Bu	29.32	$0.99 Bu	20.73
			$93.23		$76.72

Cost of Gain per lb. using 1950-59 prices: $0.19
Cost of Gain per lb. using 1960 prices: $0.15

[a] H.W. Newland, Associate Professor of Animal Husbandry, Michigan State University: East Lansing, Michigan, Letter to the author, December 8, 1961.

[b] 1950 through 1954 crop values, Field and Seed Crops by States, 1949-54, Statistical Bulletin No. 208, United States Department of Agriculture, Agricultural Marketing Service, Crop Reporting Board: Washington, D.C., May, 1957. 1955 through 1959 crop values, Season Average Prices Received by Farmers and Value of Production by States, United States Department of Agriculture, Agricultural Marketing Service: Washington, D.C., 1955-1960 issues.

[c] Agricultural Prices, 1960 Annual Summary, United States Department of Agriculture, Statistical Reporting Service, Crop Reporting Board: Washington, D.C., June, 1961.

[d] H.W. Newland, Associate Professor of Animal Husbandry, Michigan State University: East Lansing, Michigan and R.H. Blosser, Associate Professor of Agricultural Economics, Ohio State University: Columbus, Ohio, Letters to the author, December 8, 1961 and January 9, 1962.

[e] R.H. Blosser, loc. cit., Letter of January 9, 1962.

[f] Agricultural Prices, United States Department of Agriculture, Statistical Reporting Service, Crop Reporting Board: Washington, D.C., January 1955-December 1959 issues.

West North Central Region

One of South Dakota's principal advantages in feeding cattle is generally assumed to be due to the lower costs of feed-grains in the State, compared to other regions. The feed costs for the years considered appear to support this belief.

South Dakota had the lowest feed costs of all states considered, using both 1960 prices and 1950-59 prices. Total cost for a typical ration in South Dakota using 1960 prices was $72.70. The cost of gain per pound was 15 cents. The 1950-59 price gave a total cost of $87.29, and a cost of gain per pound of 17 cents. (Table 7)

Table 7. Cost of Ingredients for a Typical Ration[a] for Beef Cattle 650-1150 Pounds for South Dakota (West North Central Region) Using 1950-59 and 1960 Average Prices

Ingredient	Amount Used	1950-59 Price[b]	Total Cost	1960 Price[c]	Total Cost
Corn	36 Bu	$1.22 Bu	$43.92	$ .86 Bu	$30.96
Hay	0.4 T	15.80 T	6.32	16.50 T	6.60
Corn Silage	3 T	7.00 T[d]	21.00	7.00 T[d]	21.00
Soybean Meal	340 Lbs	$4.72 Cwt[e]	16.05	$4.16 Cwt	14.14
			$87.29		$72.70

Cost of Gain per lb. using 1950-59 prices: $0.17
Cost of Gain per lb. using 1960 prices: $0.15

[a]Hal Routhe and Paul Hasbarger, Extension Economists, Cattle Feeders Guide, p.2, Agricultural Extension Service, University of Minnesota: St. Paul, Minnesota, 1961-62.

[b]1950 through 1954 crop values, Field and Seed Crops by States, 1949-54, Statistical Bulletin No. 208, United States Department of Agriculture, Agricultural Marketing Service, Crop Reporting Board: Washington, D.C., May, 1957. 1955 through 1959 crop values, Season Average Prices Received by Farmers and Value of Production by States, United States Department of Agriculture, Agricultural Marketing Service: Washington, D.C., 1955-1960 issues.

[c]Agricultural Prices, 1960 Annual Summary, United States Department of Agricultural, Statistical Reporting Service, Crop Reporting Board: Washington, D.C., June, 1961.

[d]Hollis Hall, Extension Dairyman, South Dakota State College: Brookings, South Dakota, Personal interview, February, 1962.

[e]Agricultural Prices in South Dakota, Crop and Livestock Reporting Service: Sioux Falls, South Dakota, March, 1961.

Regional Comparison of Feed Cost

Cost of producing beef depends upon two factors: (1) the efficiency with which the agents of production are used--that is, the ratio of output to input--and (2) the cost of these agents.

Efficiency is difficult to measure; the best thing that can be shown is rate of gain by regions. One of the major costs among inputs for producing beef is the feed cost.

The feed cost of bringing a 400 pound feeder animal to a finished weight of 1150 pounds was less in South Dakota than in any of the other states studied. In using 1960 prices, the highest cost of gain per pound was 18 cents, for the Southern region, whereas the West North Central region had the cheapest gain, 13 cent per pound. The Western and Northeastern regions had equal costs per pound of gain of 17 cents. The East North Central region had a cost of gain of 14 cents a pound.(Table 8)

Table 8. A Comparison of Total Feed Costs[a] and Cost of Gain Per Pound for All Regions for Bringing One Steer or Heifer from 400 to 1150 Pounds, Using 1950-59 and 1960 Average Prices

Region Represented	1950-59 Av. Prices Total Cost	Cost of Gain (Per Lb.)	1960 Prices Total Cost	Cost of Gain (Per Lb.)
Southern	$154.57	$0.21	$137.70	$0.18
Western	136.38	0.18	124.58	0.17
Northeastern	139.94	0.19	130.77	0.17
East North Central	130.08	0.17	106.11	0.14
West North Central	120.54	0.16	98.71	0.13

[a]Total feed costs obtained by adding calf ration costs and fattening ration costs.

When 1950-59 prices were applied, the cost of gain was increased in every region. The relative positions, however, changed little.

The Southern region still had the highest cost of 21 cents per pound. The Northeastern region had a cost of 19 cents per pound. The other regions ranked as follows: Western, 18 cents per pound; East North Central region, 17 cents; and West North Central, 16 cents per pound.

SOURCES OF SOUTH DAKOTA'S LOWER FEED COST

Part of the difference in feed cost between South Dakota and each of the other states is due to the difference in efficiency (rate of gain as used here), and part is due to differences in prices (cost of feedstuffs).

The rate of gain for South Dakota was lower than that for other regions, with the exception of the Northeastern region. This has a negative effect on South Dakota's feed cost because the rate of gain determines the total amount of feed necessary to obtain a certain weight. With a lower rate of gain the amount of feed required is greater. Thus, the advantage which South Dakota has in feed cost is due to lower feed prices and not to higher rate of gain.

When South Dakota feed cost was compared to that of the Southern region, the rate of gain was found to have an effect of -1.14 per cent. Lower feed prices accounted for 101.14 per cent of the difference in feed cost. In comparing the feed cost of South Dakota to that of the Western region, it was found that the rate of gain had an effect of -1.29 per cent; the lower feed prices accounted for 101.29 per cent of the difference in feed cost. The same relative situation existed when South Dakota's feed cost was compared to that of the East North Central region. The rate of gain had an effect of -1.01 per cent;

the lower feed prices accounted for 101.01 per cent of the difference in feed cost. South Dakota's rate of gain showed a positive contribution to the state's feed cost in comparison with the cost of the Northeastern region. Gain per day contributed +27.3 per cent; feed prices contributed 72.7 per cent. (Table 9)

Table 9. The Contribution of Rate of Gain and Feed Prices to South Dakota's Lower Feeding Costs, in Per Cent, by Regions[a]

South Dakota's Costs Lower Than That of:	Due to Difference in: Gain per day	Price of feed	Total Effect
Southern Region	-1.14%	+101.14%	100%
Western Region	-1.29%	+101.29%	100%
Northeastern Region	+27.3%	+ 72.7%	100%
E. North Central Region	-1.01%	+101.01%	100%

[a]Percentage effect of gain per day computed from Table 2. The per cent contribution of feed prices is the remainder necessary to make a total effect of 100 per cent after computing the effect of gain per day.

TRANSPORTATION AND SHRINKAGE COST FOR SHIPPING SOUTH DAKOTA BEEF

Except for local consumption, South Dakota feedlots are located considerable distance from fed-cattle markets. This factor of distance means that for producers in the state to compete, South Dakota production costs must be lower, by the amount of transportation and shrinkage costs, than production costs in feeding areas adjacent to markets.

In analyzing marketing costs, one must consider the form in which beef is marketed, whether live or dressed. The form is important because it affects the weight of the product. Transportation costs

were analyzed for both live-shipping of cattle and dressed-shipping. The rates for shipping live animals by rail are paper-rates, not the cost of actual shipments.

The transportation cost for dressed beef was computed on the basis of 60 per cent dressing percentage, minus a 1 per cent carcass shrink due to cooling. This gives a 59 per cent dressed-out weight or (0.59 x 1150 pound animal) 679 pounds of dressed meat. The cooling shrinkage may vary with the temperature of the car, distance travelled, and the length of time in transit. Overall, there is about a 2 per cent to 3 per cent weight-loss due to the drawing-off of moisture; however, most of this loss is figured into the initial dressing-out percentage.[3]

Shipping Costs, Live and Dressed Weight

The cost per hundredweight for shipping slaughter animals on the hoof by railroad from Sioux Falls, South Dakota ranged from $1.72 (Detroit, Michigan) to $2.26 (Los Angeles and San Francisco, California). The cost per hundredweight for shipping liveweight to California and New York was less than for shipping beef carcasses. The opposite was true for shipping to Raleigh, North Carolina, and Detroit, Michigan.

At equal rates per hundredweight the dressed-weight cost per animal would equal 59 per cent of the live-weight cost (assuming a 59 per cent dressed-out weight). The total cost of shipping carcasses to Detroit was 56 per cent of the live animal cost. The respective ratios to other destinations were: Raleigh, North Carolina, 59 per cent; New

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[3]Harold Tuma, Assistant Professor of Animal Science, South Dakota State College; Brookings, South Dakota, Personal interview, March 1962.

York City, 63 per cent; Los Angeles and San Francisco, 81 per cent.

Table 10. Railroad Transportation Costs for Shipping 1150 Pound Beef Animal, Live and Dressed-Weight Bases, Sioux Falls to Other Regions

Destination	Live-Weight Cost		Dressed-Weight Cost	
	per cwt.	Total	per cwt.	Total
Raleigh, N.C.	$2.09	$24.03	$2.08	$14.12
Los Angeles and San Francisco, Calif.	2.26	25.98	2.79	18.97
New York City	2.16	24.83	2.28	15.54
Detroit, Mich.	1.72	19.77	1.59	10.80

Source: South Dakota Public Utilities Commission, Pierre (Liveweight cost); John Morrell and Company, Sioux Falls, South Dakota (dressed-weight cost).

Live Animal Shrinkage

Shrinkage must be considered as a part of transportation cost for shipping live animals. A recent study indicated that fat cattle will shrink about 10 per cent in an eighty-four hour period in-transit and then get a "fill-back" of about 4 per cent, giving a net shrinkage of 6 per cent. Live shipments by rail will be in-transit a minimum of eighty-four hours to each of the destinations considered. Cattle shipped by truck to the areas considered can be expected to shrink about the same percentage of weight as those shipped by rail. The main determinant of shrinkage is the time enroute. After about thirty-six to forty-eight hours in-transit, cattle suffer little additional shrinkage.[4]

[4] In-transit Shrinkage of Cattle, Circular No. 78, Western Livestock Marketing Research Technical Committee, Agricultural Experiment Station, University of Wyoming: Laramie, Wyoming, February, 1957.

In-transit shrinkage was computed by finding the difference between the feed cost per pound of finished animal before and after allowing for shrinkage. This difference is multiplied by the net gain (weight after shrinkage) to give an average shrinkage-cost per animal of $11.10 at 1950-59 feed prices, and $9.06 at 1960 feed prices. The increase in cost per pound of gain using 1950-59 prices was 1.63 cents; using 1960 prices the increase in cost was 1.33 cents a pound.

Effect of Shrinkage on Transportation Cost

Transportation costs for beef depend upon the form shipped (whether live or dressed) as well as upon distance. Transportation costs for beef vary more with the form of the product than with the distance shipped. In every case illustrated, total transportation costs per animal were considerably less for dress-beef than for live-animal transportation.

However, it must be pointed out that the live-weight rail rates are "paper rates." That is, there has been no use of this method of transporting beef to these destinations. Should a demand develop for live-beef transportation to these areas, lower rates would become effective. It has been estimated that live-weight freight rates would possibly be reduced as much as 15 per cent to the West Coast, should a demand be created.[5]

An additional cost in shipping live animals is weight loss due to shrinkage. When a 6 per cent live animal shrinkage allowance is made the cost advantage of shipping carcass beef is increased. Dressed-

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[5]C. A. Carr, Rate Analyst, Public Utilities Commission, State of South Dakota: Pierre, South Dakota, Letter of January 4, 1961.

weight shipment cost is 35 to 40 per cent of live-weight cost per animal to Detroit, Michigan. Carcass beef shipment to California is slightly more than half as costly as shipment of live animals. To Eastern seaboard destinations shipping dressed beef costs 40 to 45 per cent as much as shipping live animals.

Table 11. Transfer Costs for 1150 Pound Beef Animal, Live and Dressed Weight Bases, Sioux Falls, South Dakota to Other Regions

Sioux Falls, South Dakota to	Live Weight[a] 1950-59 Shrinkage Costs	Live Weight[a] 1960 Shrinkage Costs	Dressed Weight
Southern Region (Raleigh, North Carolina)	$35.13	$33.09	$14.12
Western Region (San Francisco and Los Angeles, California)	37.08	35.04	18.97
Northeastern Region (New York, New York)	35.53	33.89	15.54
East North Central Region (Detroit, Michigan)	30.87	28.83	10.80

[a]Live-weight transfer costs are calculated by adding transportation cost to shrinkage cost. The 1950-59 shrinkage cost is $11.10 and the 1960 shrinkage cost is $9.06.

FEEDER ANIMAL, FEED AND SHIPPING COSTS, BY REGIONS

The cost of purchasing 400 feeder animals was added to feed and shipping costs in making regional comparisons. The available sources provide price data on a weight basis only. With this limited breakdown, prices for the various states are not completely comparable on a quality basis.

Cost of Feeder Calves by Regions

Among the areas considered, the East North Central region (Michigan) had the highest cost for 400 pound feeder calves. The 1950-59 price in Michigan was $25.21 per hundredweight. Prices in other states ranged from $22.25 to $22.93 per hundredweight. The South Dakota price was $22.39, third among the five states.

In 1960 the cost of 400 pound feeder calves in Michigan was $26.10 per hundredweight. South Dakota's cost was $24.60 per hundredweight. Other states had costs from $22.60 to $24.30, with California and New York having the lowest costs in 1960 as well as 1950-59. Per hundredweight and total costs for 400 pound feeder calves are shown in Table 12.

Table 12. Average Cost of 400 Pound Feeder Calves by Regions, Using 1950-59 and 1960 Average Prices

Region Represented	1950-59		1960	
	Cost per Cwt.	Total Cost	Cost per Cwt.	Total Cost
Southern Region (North Carolina)	$22.93	$91.72	$24.40	$97.60
Western Region (California)	22.26	89.04	24.30	97.20
Northeast Region (New York)	22.25	89.00	22.60	90.40
East North Central Region (Michigan)	25.21	100.84	26.10	104.40
West North Central Region (South Dakota)	22.39	89.56	24.60	98.40

Source: Prices Received by Farmers for Calves, 1909-1960, Statistical Bulletin No. 294, pp. 5-52, United States Department of Agriculture, Statistical Reporting Service, Crop Reporting Board: Washington, D.C.,September, 1961.

Regional Comparison of Feeder Animal and Feed Costs

The combined cost, by region, of a 400 pound feeder calf and the feed to finish the animal to 1150 pounds was computed for 1950-59 prices and for 1960 prices. Using 1950-59 prices for calves and feed, South Dakota showed the lowest cost, $210.10 per animal, among the five areas. The Western region (California) had the second lowest cost, $225.42. The other regions had costs as follows: The Northeastern (New York), $228.94; the East North Central (Michigan), $230.92; and the Southern (North Carolina), $246.29.

Again, South Dakota had the lowest cost, $197.11, when 1960 prices were applied. The East North Central region had the second lowest cost, $210.51. The Northeastern region had a cost of $221.17 followed by the Western region with a cost of $221.78 and the Southern region with a cost of $235.30.

South Dakota Total Costs Compared to Those of Other Regions

By adding transfer cost to the feeder animal and feed costs for South Dakota, one is better able to assess the competitive position of South Dakota in relation to the other regions.

With 1950-59 prices applied to the imputs considered, South Dakota was found to be competitive with three of the four regions when shipping dressed beef, while the state could compete with only one region when shipping live beef. The cost per 1150 pound animal for the Southern region was $246.29 compared with South Dakota costs of $224.22, dressed, and $235.23, live. The Northeastern region had a cost of $228.94 compared to South Dakota costs of $225.64, dressed, and

$245.63 live. The East North Central region had a cost of $230.92 compared to South Dakota costs of $220.90, dressed, and $240.97, live. South Dakota could not compete with the Western region with 1950-59 prices with either dressed or live beef. California's cost was $225.42, while South Dakota's costs were $229.07, dressed, and $247.18, live.

Using 1960 prices, South Dakota could compete in the same regions as with the 1950-59 prices, with one exception. With 1960 prices South Dakota could compete with california in shipping dressed-beef; this was not the case with 1950-59 prices. (Table 13)

Table 13. South Dakota Calf, Feed and Transfer Costs, Compared to Calf and Feed Costs in Other Areas for Producing a 1150 Pound Beef Animal, Using 1950-59 and 1960 Average Prices

Region Represented	1950-59 Prices			1960 Prices		
	Other Region Costs[a]	South Dakota Costs[b]		Other Region Costs[a]	South Dakota Costs[b]	
		Shipping Dressed	Shipping Live		Shipping Dressed	Shipping Live
Southern Region (North Carolina)	$246.29	$224.22	$245.23	$235.30	$211.23	$230.20
Western Region (California)	225.42	229.07	247.18	221.78	216.08	232.15
Northeastern Region (New York)	228.94	225.64	245.63	221.17	212.65	231.00
E. North Central Region (Michigan)	230.92	220.90	240.97	210.51	207.91	225.94

[a]Costs are a summary of feed and calf costs.

[b]South Dakota costs are a summary of feed, calf and live and dressed transfer costs.

Cost Difference, South Dakota and Other Regions

The difference between South Dakota costs and those of other regions is illustrated in Table 14.

Table 14. Differences in Fat Cattle Cost per Hundred-Weight by Regions, Compared to South Dakota Costs, Dressed and Live-Weight Bases

South Dakota costs* Compared to	1950-59 Prices		1960 Prices	
	Dressed/Cwt	Live/Cwt	Dressed/Cwt	Live/Cwt
Southern Region (North Carolina)	$-3.25	$-0.09	$-3.54	$-0.44
Western Region (California)	+0.54	+1.89	-0.84	+0.90
Northeastern Region (New York)	-0.48	+1.45	-1.25	+0.85
E. North Central Region (Michigan)	-1.48	+0.87	-0.38	+1.34

*The per hundredweight cost for each region was subtracted from the South Dakota costs. Thus a minus figure indicates a lower cost and a plus figure a higher cost for South Dakota compared to the other regions.

This difference emphasizes the economic advantage or disadvantage of South Dakota compared with other regions. Using 1950-59 prices, the greatest economic advantage South Dakota had, $3.25 a hundredweight, was in shipping dressed-beef to the Southern region. The advantage to the East North Central region was $1.48 per hundred-weight (dressed). The economic advantage of the Northeastern region was $0.48 per hundredweight (dressed). South Dakota had a disadvantage for all the live-weight shipments except to the South, where there was an advantage of $0.09 per hundredweight. South Dakota showed a disadvantage for live and for dressed shipments to the Western region.

When 1960 prices were applied, South Dakota had the following economic advantages with dressed shipments: $3.54 per hundredweight to the Southern region, $0.84 per hundredweight to the Western region, $1.25 per hundredweight to the Northeastern region, and $0.38 per hundredweight to the East North Central region. With live shipments, the only region with which South Dakota could compete was the Southern region, where there was an advantage of $0.44 per hundredweight.

In most cases South Dakota was in a more favorable position at 1960 prices than at 1950-59 prices. The dressed-shipment advantage, per hundredweight, at 1960 prices compared to 1950-59 prices, was $0.29 for the Southern region, $1.38 for the Western region, and $0.77 for the Northeastern region. However, in the East North Central region, there was $1.10 per hundredweight decrease in advantage at 1960 prices, compared to 1950-59 prices. With live shipments, there was an increase in advantage of $0.35 per hundredweight for the Southern region at 1960 prices.

SUMMARY AND CONCLUSIONS

South Dakota produces two of the basic inputs, cattle and feed, necessary for producing finished beef. Whether the present level of cattle feeding should be altered is an important consideration for the general economic welfare of the State.

The purpose of this study was to compare the cost of producing and marketing beef in South Dakota with the cost of producing beef in several major consuming areas of the United States. Four areas were considered; they represent the major geographic regions of the United

States, The costs of two principal beef-producing resources, feeder animals and feedstuffs, as well as shipping costs were included in the analysis.

Compared with states representing the various regions of the United States, South Dakota (representing the West North Central region) had the lowest cost of gain for beef production. The representative states included North Carolina (Southern region), California (Western region), New York (Northeastern region), and Michigan (East North Central region). The Southern region showed the highest cost per pound of gain for both the 1950-59 period and 1960.

Of all regions, South Dakota still had the lowest costs and the Southern region had the highest costs, when the cost of the feeder animal was added to feed cost, for the decade (1950-59), and for 1960. The ranking, from lowest to the highest-cost region, was as follows: West North Central, East North Central, Northeastern, Western, and Southern.

The source of South Dakota's lower cost of producing a finished beef animal is attributable to lower feed prices, rather than a faster rate of gain or lower feeder animal cost, compared to other regions.

The economic advantage for South Dakota was reduced when transfer costs were added to the feed and feeder animal costs. Whether South Dakota had lower costs than the importing areas depended upon the form in which the beef was shipped from South Dakota. With the application of 1950-59 prices, South Dakota could compete with all regions, except the Western region, in shipping dressed beef. The only region that South Dakota could compete with in shipping live animals was the

Southern region. Utilizing 1960 price data, South Dakota could compete with all regions in shipping dressed beef but could compete with only the Southern region when shipping live animals. With both sets of prices, shipping to the Southern region gave the greatest advantage to South Dakota.

From the cost comparisons made it was concluded that South Dakota cattle feeders can produce beef at costs comparable to those of beef producers in major consuming areas if they ship the beef in dressed form. This conclusion does not consider the added advantage for the State that might result from by-products, increased employment, and other benefits due to having slaughtering-plant activities within the State. Logically, the next step might be to investigate the feasibility of increased beef slaughtering activity within the State.

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